A. Descriptive Title Of The Invention:

A Water-Excluding Valve Assembly For A Snorkel

B. Cross Reference To Related Applications:

None

C. Statement Regarding Federal Sponsored R & D:

None

D. Reference To A "Microfiche Appendix:

None

E. Background Of The Invention

Field of the Invention

This invention relates to snorkels, specifically to a water excluding valve assembly which is easily attached to the top of a standard, inexpensive snorkel providing the snorkel with a novel water excluding feature.

Description of Related Art

Underwater exploring and fishing through SCUBA diving or snorkeling has long been one of the most popular water sports. While using the most basic of equipment, a mask, fins, and a snorkel, the snorkeler swims just under the surface of the water, face down, and observes a new world under the water.

The snorkel, in its most primitive form, is little more than a tube extending out of the water and into the air above the water surface, and a mouthpiece through which the snorkeler draws air while viewing the underwater sights. Such a basic snorkel as just described usually cost only a few dollars and can be purchased anywhere from dive shops to drugstores and supermarkets.

However, the device as just described, while still a lot of fun for the snorkeler, provides no protection from inadvertent water entry. Many times during snorkeling, the user must stop snorkeling in order to clear the breathing tube of water. This is bothersome. In addition, if a

snorkeler dives to a depth deeper than the distance of the breathing tube, the tube always fills with water and requires the snorkeler to stop swimming, resurface and clear the breathing tube of the water in order to further use the snorkel.

Few prior art attempts address an adapter for a snorkel with the express purpose of excluding water. Most prior art attempts to invent "dry" snorkels include snorkels in their entirety and include the breathing tube and mouthpiece of the basic snorkel but may also having multiple airways, flapper type check valves, and separate air inlet and water outlet paths. These are costly and generally reserved for experienced snorkelers. These prior art patents are nothing like the applicant's novel water excluding valve assembly for use with a standard, basic snorkel. None of the prior snorkel art describes the simple water-excluding valve assembly of applicant's claimed invention. Applicant's novel invention when added to a basic, inexpensive snorkel apparatus converts a "drugstore snorkel" to a more expensive "dry" snorkel and provides simple added features not found in even the more complex and more professional snorkels.

Winefordner, et al., U. S. Pat. No. 5,960,791, teaches a water excluding valve assembly for adding to a basic snorkel. This patent, however, uses a flapper type of valve design. The snorkel airway tube receiving the valve assembly must be facing upward for the flapper valve of the invention to work. The user must remain face down exclusively and the tube must be close to vertical in relation to the horizontal plane of the water for the valve to work properly. If the user is tilted or jostled from side to side causing the tube to tilt (as is typical of snorkeling in rough water) then the flapper valve will open and water will flood the airway passage. This is a definite disadvantage for a snorkeler. This disadvantage has been overcome with applicant's novel invention.

Lin, U.S Pat. No. 5,117,817 teaches a complete snorkel (not just the valve accessory) designed specifically for a complex snorkel assembly. The Lin patent is for a multi-tubular, coaxial diving snorkel. The Lin snorkel has separate concentric inlet and outlet airways each having its own diaphragm flapper type check valve. A single float actuates these separate valves. These separate valves will only operate with the coaxial multi-tubular airways. Therefore this configuration is only adaptable to the Lin patent snorkel assembly. The Lin patent is a far cry from applicant's novel invention which may be adapted to fit an inexpensive, basic, single airway snorkel.

Hunt, U. S. Pat. No. 4,805,610, also teaches a complete snorkel having a ball type water excluding valve. The device described in the Hunt patent is large and cumbersome. It uses a ball to close the airway passage that is separate from the float. Furthermore, the seat with which the ball works, is part of the airway tube itself, virtually eliminating the valve assembly from being used on any other snorkel.

F. Summary Of The Invention

Objective And Advantages

The present invention provides a water-excluding valve assembly for a diving snorkel which can easily be attached to an existing, simple, low cost snorkel giving it features of a more expensive snorkel.

G. Description Of The Drawings

The details and many of the advantages provided by this invention will become clear and will be better understood by reviewing the following description and accompanying drawings, wherein:

Fig. 1, is a top perspective view of the present invention, a water-excluding valve assembly for a diving snorkel,

Fig. 1a, is an exploded top perspective view of the present invention (the spherical float element is shown outside the cage for clarity), and

Fig. 2, is an exploded top perspective view of the valve assembly with its cage cut in a half section view.

H. Detailed Description

The preferred embodiment of the water-excluding valve assembly for a diving snorkel of the present invention is illustrated in the top perspective view, Fig. 1. For increased clarity, Fig. 1a depicts an exploded top perspective view having the spherical float located outside the cage for clarity only. However, in reality, the spherical float must be inside the cage to practice the invention.

As shown in Fig. 1, the valve assembly **10** of the present invention has a cap **18**, a cage **16**, a base **12**, and a spherical float **24**. The cap, cage and base are injection molded of an acceptable material such as for example plastic. The spherical float would be made of an acceptable material having buoyancy such as for example urethane.

The cage **16** is formed by the assembly of an upper piece **32**, a lower piece **36** and a plurality of hollow posts **30**. As shown in Fig. 1a, the upper piece **32** has a plurality of openings **34** about its circumference and the lower piece **36** has a plurality of openings (not shown) about its circumference. There are a plurality of hollow posts **30** affixed to the upper piece **32** and the lower piece **36** at their respective openings. The assembly of these three components (the upper piece, the posts, and the lower piece) forms the cage **16**. A spherical float **24** is captive within the cage **16**. Furthermore, the upper piece has a main opening **40** about its centerline axis and protruding from the bottom of the upper piece **32**. This main opening forms a ball valve seat **38**. In addition, the spherical float **24** is free to move between the ball valve seat opening of the upper piece and the top of the lower piece while trapped within the central chamber of the cage. The spherical float **24** and the ball valve seat **38** form a watertight seal when in communication with one another. A base **12** with a barb **28** completes the valve assembly structure.

The cap **18** in Fig. 1and Fig. 1a is attached to the upper end of cage **16** by standard means, such as for example threads or cement. Similarly, base **12** is affixed to the bottom end of the cage **16** by standard means, such as for example threads or cement.

When the cap **18** and the upper end of the cage **16** are communicating with one another, the interior space created therein form an upper air chamber. When the lower end of the cage **16** and the base **12** are communicating with one another, the interior space created therein form a lower air chamber. Since the posts of the cage **16** are hollow, they provide airway passages **34** which connect an upper air chamber and a lower air chamber.

The cap **18** is shown in the figures as having a slight dome. This configuration creates a convex interior air chamber within the interior space of the cap and the upper piece. An alternative embodiment would raise the edge of the lip **44** of the upper piece **32** to create a larger air chamber and permit the cap **18** to be a flat disc while still permitting an air chamber to be formed within the interior space of the cap **18** and the upper piece **32**. In a like manner,

the inventor has contemplated enlarging the lower air chamber. Neither of these alternatives are depicted in the drawings

Fig. 2 is an exploded top perspective view of the valve assembly with its cage cut in a half section view. Although the cage **16** having the spherical float trapped within is essential to practicing the invention, the exact configuration for forming the cage may be done in any number of ways. Fig. 2 depicts the cage **16** with an upper piece **32** and a lower piece **36**, and a plurality of hollow posts **30** projecting downwardly and located circumfrentially around the outer edge of the upper **32** piece forming cage **16**, and connecting the hollow posts of upper piece **32** to the matching openings in lower piece **36**. In alternative embodiments, the length of the posts may be split equally or unequally between the upper piece and the lower piece and mated together. The best embodiment the inventor has determined is to die cut the hollow posts of equal length. In other words, one-half of the length of the hollow posts are projecting downwardly from the upper piece and one-half of the length of the hollow posts are projecting upwardly from the lower piece.

Since the posts are hollow, they provide airway passages **34** which connect an upper chamber and a lower chamber. Within the cage **16**, a spherical float **24** is held captive between the posts **30**, and is allowed to freely move between the lower piece **36** at its lower end and the upper piece **32** at its upper end. A main opening **40** located about the central axis of the upper piece **32** provides a passage into the upper chamber from outside the valve assembly. A float seat **38** is formed by the main opening **40** as a means for receiving the spherical float when it is in its upper most position, thereby sealing the passage. In normal use, when the valve assembly **10** is immersed under water, the spherical float **24** will float to its upper most position and firmly engage the float seat **38**, thereby shutting off the passage and preventing water from entering the passage. Fig. 2 shows a lower piece **12** with a soft rectangular shaped tube barb **28** needed to adapt to soft rectangular shaped snorkel airway tubes.

In Fig. 1 and Fig. 1a, the base **12** has at its lower end a hose barb **28** which is round and sized to fit inside a typical round snorkel tube in the preferred embodiment. As an alternative embodiment, hose barb **28** may be rectangular in shape to fit inside a typical rectangular snorkel tube. As a third embodiment, the hose barb may be triangular in shape to fit inside a

typical triangular snorkel tube.

To manufacture, one must begin with tooling and molding the five component parts, (1) the cap, (2) the upper piece with or without hollow posts projecting therefrom, (3) the lower piece with or without hollow posts projecting therefrom, (4) a base with a barb, and (5) a floating sphere. After the component parts are made and assembled, the cap is affixed to the upper piece. The upper piece is affixed to the lower piece. This is done by mating the upper hollow posts or openings with the lower hollow posts or openings. One must use care at this time to trap the spherical float within the interior space of the "cage" (which has been formed by the union of the upper piece, the lower piece, and their connecting hollow posts.) The base is affixed to the bottom of the lower piece and the simple assembly of the water-excluding valve is completed. With the exception of trapping the sphere within the cage, the order of the assembly of the component parts is not essential to practice the invention.

To use the device, one simply inserts the barb of the device into the opening of a standard snorkel tube and swims on the surface of the water while peering downwardly into the water below.